IN THE CLAIMS:

The following listing of claims will replace all prior versions, and listings, of the claims in the application:

1.   (Currently amended) A computer-implemented method for determining parameters of a three-dimensional scene using a reverse-rendering function, the method comprising:

receiving image data comprising a plurality of photographic images of a three-dimensional scene;

receiving a first directed acyclic graph of the scene, the first directed acyclic graph defining transforms between hierarchically-related nodes of the graph;

receiving user input indicating a plurality of corresponding features each appearing in at least two of the plurality of photographic images and associated with a node of the first directed acylic graph;

determining an error function for a reverse-rendering function, the reverse-rendering function defining a relationship consistent with the first directed acylic graph between three-dimensional coordinates in the three-dimensional scene and corresponding two-dimensional coordinates of the plurality of corresponding features; and

minimizing the error function to determine a solution corresponding to a global minimum of the error function, comprising calculating at least first derivatives of the error function using automatic differentiation, thereby computing intermediate solution estimates for successive iterations of the error function, until the solution estimates converge to the solution.

2.   (Original) The method of Claim 1, wherein the determining step further comprises determining the error function comprising reverse-rendering parameters selected from group consisting of camera position, camera orientation, focal length, aperture size, lens distortion, and distortion of focal plane.

3.   (Original) The method of Claim 1, wherein the determining step further comprises determining the error function comprising reverse-rendering parameters including at least one camera position located within the three-dimensional scene.

4-5.   (Cancelled)

6.   (Original) The method of Claim 1, wherein the minimizing step further comprises calculating an exact Hessian of the error function.

7.   (Original) The method of Claim 1, further comprising initializing at least selected three-dimensional coordinates of the plurality of corresponding features and camera parameters for the plurality of photographic images as an initial solution estimate.

8.   (Currently amended) The method of Claim 1, further comprising defining a ~~resulting scene graph for the scene~~ second directed acyclic graph, consistent with the solution.

9.   (Original) The method of Claim 1, wherein the determining step further comprises determining the error function further defined by a user-selected differentiable relationship between user-selected parameters of the reverse-rendering function.

10.   (Original) The method of Claim 1, wherein the determining step further comprises determining the error function further defined by animation parameters to solve match-moving relationships between frames of a motion picture sequence.

11.   (Original)   The method of Claim 1, wherein the receiving step further comprises receiving the plurality of photographic images representing a time sequence, wherein the determining step further comprises determining the error function further defined by time parameters for solving match-moving relationships between frames of a motion picture sequence, and wherein the minimizing step further comprises minimizing the error function simultaneously over the frames.

12.   (Original)   The method of Claim 1, wherein the receiving image data step comprises receiving the photographic images comprising digital images from a digital camera.

13.   (Original)   A method for determining parameters of a three-dimensional scene using a reverse-rendering function, the method comprising:
    receiving a plurality of two-dimensional images, at least one of the images captured using a camera posed inside of the three-dimensional scene; and
    determining an error function for a reverse-rendering function, the reverse-rendering function defining a relationship between three-dimensional coordinates in the three-dimensional scene and corresponding two-dimensional coordinates of a plurality of corresponding features in the two-dimensional images; and
    minimizing the error function to determine a solution corresponding to a global minimum of the error function, thereby computing intermediate solution estimates for successive iterations of the error function, until the solution estimates converge to the solution.

14.   (Original)   The method of Claim 13, further comprising receiving an initial scene graph comprising estimated scene parameters; and
    defining an initial solution estimate for the error function based on the estimated scene parameters.

15. (Original) The method of Claim 14, wherein the receiving an initial scene graph step further comprises receiving the estimated parameters of the scene comprising at least one transform defining a relationship between a parent object and a child object.

16. (Original) The method of Claim 13, wherein the determining step further comprises determining the error function further defined by a user-selected differentiable relationship between user-selected ones of the parameters.

17. (Original) The method of Claim 13, wherein the determining step further comprises determining the error function further defined by animation parameters to solve match-moving relationships between frames of a motion picture sequence.

18. (Original) The method of Claim 13, wherein the minimizing step further comprises calculating an Hessian matrix using automatic differentiation, thereby guiding the minimizing step according to Newton's method.

19. (Currently amended) A system for defining a digital model of a three-dimensional scene using photogrammetry, the system comprising:

a computer having a memory, the memory holding program instructions comprising:

receiving image data comprising a plurality of photographic images of a three-dimensional scene;

receiving a first directed acyclic graph of the scene, the first directed acyclic graph defining transforms between hierarchically-related nodes of the graph;

receiving user input indicating a plurality of corresponding features each appearing in at least two of the plurality of photographic images and associated with a node of the first directed acylic graph;

determining an error function for a reverse-rendering function, the reverse-rendering function defining a relationship consistent with the first directed acylic graph between three-dimensional coordinates in the three-dimensional scene and corresponding two-dimensional coordinates of the plurality of corresponding features; and

minimizing the error function to determine a solution corresponding to a global minimum of the error function, comprising calculating at least first derivatives of the error function using automatic differentiation, thereby computing intermediate solution estimates for successive iterations of the error function, until the solution estimates converge to the solution.

20. (Original) The system of Claim 19, wherein the program instructions further comprise receiving an initial scene graph comprising at least a portion of an initial solution estimate.

21.   (Original)   The system of Claim 19, wherein the program instructions further comprise instructions for determining the error function further defined by a user-selected differentiable relationship between user-selected ones of the parameters.

22.   (Original)   The system of Claim 19, wherein the program instructions further comprise instructions for determining the error function further defined by animation parameters to solve match-moving relationships between frames of a motion picture sequence.

23.   (Original)   The system of Claim 20, wherein the program instructions further comprise instructions for minimizing the error function by calculating an Hessian matrix using automatic differentiation, thereby guiding the iteration step according to Newton's method.

24.   (Original)   The system of Claim 20, wherein the program instructions further comprise instructions for receiving the plurality of photographic images representing a time sequence, wherein the determining step further comprises determining the error function further defined by time parameters for solving match-moving relationships between frames of a motion picture sequence, and wherein the minimizing step further comprises minimizing the error function simultaneously over the frames.

25.   (Original)   The system of Claim 19, wherein the program instructions further comprise instructions for receiving the image data comprising at least one image from a camera at an unknown location inside the three-dimensional scene.